BULLETIN

OF THE INSTITUTE OF METALS

VOLUME 3 JULY 1957 PART 23

INSTITUTE NEWS

Powder Metallurgy Joint Group

The Councils of The Iron and Steel Institute and of The Institute of Metals have formed a Powder Metallurgy Joint Group, the objects of which are to facilitate the study of the science, technology, and practice of powder metallurgy.

Membership of the Joint Group will be restricted to members of the two Institutes, and notices of meetings and activities of the Group will be sent only to those who have registered as members of the Group.

Papers on powder metallurgy will be published either in the *Journal of The Iron and Steel Institute* or the *Journal of The Institute of Metals*. Joint members will, therefore, receive all papers published by the two Institutes which are of direct concern to the Group. Members of the Group who are members of one of the Institutes only, however, will be able to obtain copies of powder metallurgy papers published by the Institute of which they are not members, for a small annual subscription, details of which will be announced later.

The affairs of the Group will be conducted by a Powder Metallurgy Joint Committee, which will arrange meetings, symposia, and lectures.

The Committee proposes, in the first instance, to arrange two whole-day or half-day meetings each year. It has, however, been considered inadvisable to hold a summer meeting in 1957 in view of the number of meetings, including two meetings on powder metallurgy in Europe, that have already been arranged.

The Inaugural Meeting of the Joint Group will be held at Church House, Great Smith Street, London, S.W.1, on Wednesday, 4 December 1957. The programme will be:

10.0 a.m. Coffee.

10.30 a.m. Introductory statement regarding the aims and activities of the Joint Group, followed by Lecture on "Recent Developments in Powder Metallurgy", by Dr. Ivor Jenkins.

11.30 a.m. Session on "Developments in the Production and Quality of Metal Powders". Presentation and discussion of short papers.

1.30 p.m. Buffet lunch.

2.30 to 5.0 p.m. Session on "Developments in the Production and Quality of Metal Powders" continued. Presentation and discussion of additional short papers.

Other meetings planned are:

March 1958. Whole-Day Informal Discussion on "Developments in the Practice of Compacting and Sintering".

Autumn 1958. Whole-Day Discussion on "The Powder Metallurgy of Ceramic-Metal Materials", for which a number of original research papers will be published in advance.

All members should by now have received a circular letter on this matter, and those who desire to be registered (without additional subscription) as members of the Powder Metallurgy Joint Group should (if they have not already done so) complete the Registration Form, and return it to Lieut.-Colonel S. C. Guillan, 17 Belgrave Square, London S.W.1, who will act as Secretary to the Joint Committee and will be responsible for arrangements made for meetings of the Group.

Election of Members

The following 6 Overseas Sustaining Members, 33 Ordinary Members, 4 Junior Members, and 6 Student Members were elected on 30 May 1957:

As Overseas Sustaining Members

ALUMINIUM COMPANY OF CANADA, LTD., 1700 Sun Life Building, Montreal 2, P.Q., Canada.

AMERICAN ZINC INSTITUTE, INC., 60 East 42nd Street, New York 17, N.Y., U.S.A.

REYNOLDS METALS COMPANY, Metallurgical Research Laboratories, 4th & Canal Streets, Richmond, Va., U.S.A.

SOCIÉTÉ ALSACIENNE DE CONSTRUCTIONS MÉCANIQUES, 69 Rue de Monceau, Paris (8e), France.

SOCIÉTÉ GÉNÉRALE DES MINERAIS, S.A., 31 rue du Marais, Bruxelles, Belgium.

SOUTH AFRICAN IRON AND STEEL INDUSTRIAL CORPORATION, LTD., P.O. Box 450, Pretoria, South Africa.

As Ordinary Members

BECK, Robert Dunlop, Manager, Henderson's (Armour St.), Ltd., 21 Armour Street, Glasgow, E.1.

BLAISE, Henry, Ing. Mec.-Elect., Administrateur-Directeur Général, Société Générale des Minerais, S.A., 31 rue du Marais, Bruxelles, Belgium.

BURROWS, James Louis, B.Sc., Technical Superintendent, Sheet, Extrusion, Forging, Foil, and Ingot-Casting Plants, Kingston Works, Aluminium Company of Canada, Ltd., Box 136, Kingston, Ont., Canada.

CHOUTEAU, René Eugène Auguste Marie, Ing., Directeur de l'Usine des Eaux-Claires, Société d'Eléctrochimie, d'Electrométallurgie et des Aciéries Electriques d'Ugine, 60 rue Ampère, Grenoble (Isère), France.

DESHPANDE, D. L., M.Sc., Principal, Bihar Institute of Technology, Sindri, India.

DROUIN, Amilcar Ferron, Ing., Electrometalurgia del Agueda, Portillo San Vicente No. 1, Salamanca, Spain.

ELLEN, Frank Peter, A.I.M., Senior Experimental Officer, United Kingdom Atomic Energy Authority, Dounreay Works, P.O. Box 1, Thurso, Caithness.

FUNK, Charles R., B.S., Metallurgist, Alco Products, Inc., Latrobe, Pa., U.S.A.

GODHAIRD, Jean Henri Joseph, Ing. Civ. Mines., Manager, Ore Department, Société Générale des Minerais, S.A., 31 rue du Marais, Bruxelles, Belgium.

GOSLING, Alec Walter, B.Sc., A.M.I.Mech.E., Works Engineer, Peter Brotherhood, Ltd., Peterborough, Northants.

HEGGSTAD, Gudmund, Siviling., Works Manager, A/S Norsk Aluminium Company, Postbox 73, Höyanger, Norway.

HERRENG, Pierre Alphonse, Directeur des Laboratoires, Société Alsacienne de Constructions Mécaniques, 51 rue de l'Amiral Mouchez, Paris (13e), France.

HINDE, Joseph, F.I.M., Development Officer, The Mond Nickel Co., Ltd., Thames House, Millbank, London, S.W.1.

HORVICK, Ernest Woodrow, B.S., Market Development Engineer, American Zinc Institute, Inc., 60 East 42nd Street, New York 17, N.Y., U.S.A.

ITO, Masao, B.Eng., Managing Director, Fuji Iron and Steel Co., Ltd., 12, 1-chome, Nihonbashi-Edobashi, Chuo-ku, Tokyo, Japan.

JÄRNEFELT, Risto Armas Johannes, M.Sc., Managing Director, Oy Esab, Pitäjanmäki, Kutomontie 13, Helsinki, Finland.

JOUVEN, Pierre, Ing., Directeur, Pechiney Compagnie de Produits Chimiques et Electrométallurgiques, 23 rue Balzac, Paris (8e), France.

JULIA, Roger Antoine, Directeur Général, Département Energie Nucléaire, Télécommunications, Electronique, Société Alsacienne de Constructions Mécaniques, 69 rue de Monceau, Paris (8e), France.

KIMBERLEY, John Lester, M.S., Executive Vice-President and Secretary, American Zinc Institute, Inc., 60 East 42nd Street, New York 17, N.Y., U.S.A.

LECOINTE, Henri Albert, Ing.Elect., Directeur Général-Adjoint, Société Générale des Minerais, S.A., 31 rue du Marais, Bruxelles, Belgium.

MACLEAN, Roy Ferguson, Director, John Allan and Co. (Glenpark), Ltd., Glenpark Road, Glasgow, E.1.

MARSHALL, Kenneth Charles Tecklenborough, Managing Director, Lightalloys, Ltd., Alpax Works, St. Leonards Road, London, N.W.10.

OELSEN, *Professor* Willy, Dr.phil.habil., Direktor des Instituts für Eisenhüttenkunde und Giessereiwesen, Bergakademie Clausthal, Clausthal, Germany.

PLANKENSTEINER, Siegfried, Dr.mont., Dipl.Ing., Qualitätstechnischer Leiter, Schoeller-Bleckmann Stahlwerke, A.G., Ternitz, N.Ö., Austria.

QVALE, Fredrik, M.S., Administrerende Direktør, A/S Sulitjelma Gruber, Fridtjof Nansens Plass 6, Oslo, Norway.

RADTKE, Schrade Fred, Ph.D., Director of Research, Metallurgical Research Laboratories, Reynolds Metals Company, 4th & Canal Streets, Richmond, Va., U.S.A.

ROLANDI, Cav. Giovanni, Dott., Amministratore Delegato–Direttore Generale, Montevecchio Società Italiana del Piombo e dello Zinco, Via Puccini 5, Milano, Italy.

ROSENTHAL, Hyman, B.Eng., Metallurgist, Arwood Precision Casting Corp., 70 Washington Street, Brooklyn 1, N.Y., U.S.A.

STEVENSON, James Elder, Managing Director, John Allan and Co. (Glenpark), Ltd., Freeth Street, Oldbury, Worcs.

SUNNUCKS, David Clement, B.Sc., Chief Metallurgist, Aluminium Company of Canada, Ltd., 1700 Sun Life Building, Montreal, P.Q., Canada.

SWEDENBORG, Håkan, B.A., Managing Director, Tekniska Röntgencentralen AB, Stockholm 51, Sweden.

SYMONDS, Irving M., B.S., Manager, Process Development Department, The American Metal Co., Ltd., 61 Broadway, New York 6, N.Y., U.S.A.

WESTBROOK, Arthur Thomas G., B.Sc., P.Eng., Assistant Controller of Tests and Materials Research, Department of Research and Development, Canadian National Railways, 1801 Leber Street, Montreal, P.Q., Canada.

As Junior Members

BODDYE, *Captain* Eric Tatton, B.A., T.A., Management Trainee, The Steel Company of Wales, Ltd., Abbey Works, Port Talbot, Glam.

DABBS, William Frederick, B.Sc., L.I.M., 8 Featherstone Road, Southall, Middlesex.

DRESHFIELD, Robert Lewis, B.S., Met.E., Graduate Assistant, Metallurgical Engineering Department, School of Mines and Metallurgy, University of Missouri, Rolla, Mo., U.S.A.

MASKREY, John Thomas, Metallurgy Division, Atomic Energy Research Establishment, Harwell, Berks.

As Student Members

BRETT, Jack S., M.S., School of Mines, Columbia University, New York 27, N.Y., U.S.A.

COCHRANE, Michael Robin, B.Sc., Research Student, Battersea College of Technology, Battersea Park Road, London, S.W.11.

PREISIG, Peter, 6 Ovington Square, London, S.W.3.

ROBERTS, John, Undergraduate, Department of Metallurgy, University College, Swansea.

SMITH, Arthur Frederick, B.Sc., Research Student, Battersea College of Technology, Battersea Park Road, London, S.W.11.

TIDMAN, Maurice Danny, Assistant Works Manager, City Plating Co., Ltd., David Road, Coventry.

PERSONAL NOTES

MR. N. D. BENSON has been appointed Technical Manager of the Kirkby factory of Imperial Chemical Industries, Ltd., Metals Division.

MR. FRASER W. BRUCE, Managing Director of the Northern Aluminium Co., Ltd., has been appointed President of Aluminium Company of Canada, Ltd.

MR. R. CHADWICK has been appointed Manager, Technical Department, Imperial Chemical Industries, Ltd., Metals Division.

MR. D. H. H. CLARKE has been appointed Joint Managing Director of James Booth and Co., Ltd., Birmingham.

MR. S. E. CLOTWORTHY, Sales Director of the Northern Aluminium Co., Ltd., has been appointed Managing Director of the Company, in succession to Mr. Fraser W. Bruce.

DR. MAURICE COOK has been elected President of the Aluminium Development Association for the year 1957–58.

MR. V. P. DELPORT, European Representative of the Penton Publishing Company, has received one of the first Service Citation Awards of the American Foundrymen's Society. It was made for distinguished service to the Society as its European Representative, especially in connection with the International Foundry Congresses.

DR. R. W. DIAMOND has been awarded the Gold Medal of the Institution of Mining and Metallurgy for 1956, in recognition of his distinguished services to the mineral industry in Canada.

MR. R. L. DUFFNER has left the Hudson Wire Co., Ossining, N.Y., and is now with the Anaconda Wire and Cable Co., Ltd., Hastings-on-Hudson, N.Y.

DR. B. S. EKELUND has been appointed Director of Metallurgical Studies to the Trionics Corporation, Madison, Wis.

MR. CHARLES FOX recently celebrated 50 years' service with Messrs. D. C. Griffiths and Company, of which firm he has been a partner since 1939.

MR. J. F. B. JACKSON has joined the board of P.I. Castings (Altrincham), Ltd.

DR. RONALD KING has been appointed first Professor of Metal Physics in the Royal Institution of Great Britain.

MR. D. C. F. LUNN has left The de Havilland Aircraft Co., Ltd., to become Deputy Chief Metallurgist, Atomic Power Construction, Ltd., London.

SIR RONALD PRAIN has been elected an Honorary Member of the Institution of Mining and Metallurgy in recognition of his services to the mineral industry.

MR. S. I. REDSTONE has left Messrs. Boult, Wade, and Tennant and is now on the staff of the Zinc Development Association.

DR. G. A. ROBERTS has been elected President of the Metal Powder Association.

DR. A. G. E. ROBIETTE has resigned from the Board of John Miles and Partners (London), Ltd., but he will be retained by them in a technical advisory capacity. He is setting up as an independent metallurgical consultant, and will be retained by metallurgical companies in Britain, South Africa, and the United States. For the time being, his address is Bury Farm, Bovingdon, Herts.

MR. G. STEVEN is now a Research Metallurgist in the Constructional Alloy Steel Section of the Research Laboratory of the Crucible Steel Company of America, Pittsburgh, Pa.

DR. J. W. TAYLOR has left the Atomic Energy Research Establishment, Harwell, and joined the Research Department of Babcock and Wilcox, Ltd., Renfrew.

DR. G. H. H. WILLIAMS has left the South Wales Aluminium Co., Ltd., and is now engaged at the Waunarlwydd titanium plant of Imperial Chemical Industries, Ltd., Metals Division.

Deaths

The Editor regrets to announce the death of:

MR. EDGAR LLEWELLYN MORCOM, M.A., Managing Director of Belliss and Morcom, Ltd., Birmingham, on 23 April. He was an Original Member of the Institute and served on the Council from 1932 to 1939.

MR. ARTHUR SPITTLE, an Original Member of the Institute, on 21 April, at the age of 82. Until his retirement in 1945, he was with Imperial Chemical Industries, Ltd., Metals Division.

MR. CHARLES EDWARD CECIL VERRALL on 6 February. He was Metallurgist in charge of Process Control, Johnson, Matthey and Co., Ltd., Wembley,

MR. HOWARD R. YOUNGKRANTZ, Chief Engineer of the Apex Smelting Co., Chicago, Ill., on 27 March.

OBITUARY

Mr. J. H. Lavender

It is with regret that we have to record the death, in his 75th year, of Mr. J. H. Lavender on 26 April last.

John Herbert Lavender was born at Wednesbury in 1882. After receiving a general education, he gained a Staffordshire Metallurgical Scholarship tenable at Birmingham University. Subsequently he held appointments as metallurgical chemist with Vickers, Ltd., Barrow-in-Furness, the Admiralty, Sheffield, the Birmingham Metal Munitions Co., Ltd., and E. G. Wrigley and Co., Ltd., Smethwick.

In 1918 Mr. Lavender established himself as a consulting metallurgist and started the South Staffordshire Heat-Treatment and Testing Works. Later he turned his attention to the foundry industry, and in 1924 he formed the firm of J. H. Lavender and Co., Ltd., aluminium founders, of which he was Chairman and Managing Director until his death.

LETTER TO THE EDITOR

A Surface Effect of Boundary Sliding during Creep

Rachinger's observation [1] that grain translation appears to be inhibited at the surface of aluminium during creep has not been satisfactorily explained and has been noted as a possible source of error in measuring the contribution of boundary sliding to creep.[2] Rachinger found on an aluminium specimen during creep at 300° C., for example, that the surface grains extended 40% when the specimen had extended 50%, but that at a depth of 0·010 in. (equivalent to two grains in depth) the grain extension was only 5% and then typical of the whole of the interior.

The purpose of this note is to put forward a possible explanation based on the grain topography which arises during annealing. There is no doubt that in froth models the boundaries of the surface " grains " take up positions normal to the surface;[3] in metals the boundaries of surface grains would tend to this equilibrium position during annealing. In the interior, however, a plane section would give boundaries intersecting the surface randomly at all angles. Thus, in a tensile specimen the transverse boundaries of grains at an as-annealed surface would,

in general, experience no forces which would cause them to slide, and this would in turn inhibit sliding at the longitudinal boundaries; the surface grains would thus be forced to elongate, as observed. This might also be expected to restrain the next layer of grains from sliding to some extent and thus give the observed depth of the effect.

Farmer's observation [4] that electropolishing after annealing gives rise to marked further migration on re-annealing would also be accounted for by the above suggestion on grain topography, as Farmer appears to imply in his own remarks.

It should be noted that this special orientation of the boundaries at the surface would apply only to surfaces present during annealing; if a depth equivalent to more than a grain diameter is removed by polishing, the surface might be expected to behave in the same way as the interior, unless the kind of readjustment observed by Farmer can take place and lead to the same distribution as in annealing, as it might well do under creep conditions. This could account for differences between observations of different workers, the results depending on whether annealing precedes polishing or not and on how much of the annealed specimen is removed.

R. C. Gifkins

Physical Metallurgy Section, C.S.I.R.O.,
University of Melbourne,
Australia.

REFERENCES

1. W. A. Rachinger, *J. Inst. Metals*, 1952–53, **81**, 33.
2. W. A. Rachinger, *ibid.*, 1952–53, **81**, 718 (discussion).
3. C. S. Smith, "Metal Interfaces", p. 75. **1952**: Cleveland (American Society for Metals).
4. M. H. Farmer, *Proc. N.P.L. Symposium on Creep and Fracture of Metals at High Temperature* (1954), **1956**, p. 137.

NEWS OF KINDRED SOCIETIES

Société Française de Métallurgie

The Autumn Meeting of the Société Française de Métallurgie will be held in Paris on 7–12 October 1957. The two main subjects to be discussed are: (*a*) "Metallurgical Problems Presented by Atomic Energy", and (*b*) "Fatigue of Metals".

OTHER NEWS

National Anti-Corrosion Week

A National Anti-Corrosion Week is being held from 14 to 19 October 1957 in order to publicize the losses due to corrosion and to suggest ways of minimizing them. The principal features of the week will be a Corrosion Convention, held at Central Hall, Westminster, on 15 and 16 October, and a Corrosion Exhibition, held at the Royal Horticultural Society's Old Hall on 15–17 October. There will also be an official Convention Dinner.

At the Convention, papers will be presented by leading authorities on many aspects of corrosion and its treatment; delegates from overseas will attend as well as from Britain. The Exhibition, the first of its kind to be held in Britain, will be open to the public.

National Anti-Corrosion Week is sponsored by the magazine *Corrosion Technology*. Application forms for registration for the Convention may be obtained from the Organizer, Corrosion Convention, Stratford House, 9 Eden Street, London, N.W.1.

Course in Special Metallurgy, Paris

A course in special metallurgy, with particular reference to the study of metals used in the nuclear-energy field, has been arranged by the Institut National des Sciences et Techniques Nucléaires in conjunction with the Metallurgy Department of the Faculty of Sciences in the University of Paris.

The lectures will deal with: (*a*) the physical metallurgy of metals and alloys, the relation between their structure and properties, and the effect of radiation, and (*b*) the metals and alloys used in the nuclear-energy industry, their manufacture and properties. Practical work will be concerned with the production and fabrication of metals and alloys and the study of their structural, physical, and chemical properties.

Background instruction will be given by Professor G. Chaudron, Professor A. Guinier, Dr. J. Hérenguel, and Professor P. Lacombe, and there will be lectures by various specialists in the nuclear-energy field.

The course, which begins on 18 November 1957 and ends on 28 June 1958, is open to foreign as well as French students. Information may be obtained from the Secretariat de l'Institut National des Sciences et Techniques Nucléaires, Boîte Postale No. 6, Gif-sur-Yvette (Seine et Oise), France.

APPOINTMENTS VACANT

ASSISTANT TECHNICAL OFFICERS—METALLURGISTS are required to assist in research work associated with the casting, rolling, drawing, heat-treatment, and jointing of aluminium and other non-ferrous alloys, as well as in the development of novel and improved fabrication techniques.

ASSISTANT TECHNICAL OFFICERS—ENGINEERS OR PHYSICISTS—are required to assist with investigational and development work in the fields of manufacturing processes of a mechanical nature, the evaluation of physical and mechanical properties of materials, and in instrumentation, including electronics.

Imperial Chemical Industries, Ltd.,
Metals Division, Kynoch Works, Witton, Birmingham 6,
quoting RES/279/JM.

CORROSION RESEARCH

The Mond Nickel Company, Ltd., require at their Birmingham Research Laboratories, a metallurgist, or chemist with metallurgical background, to undertake research relating to practical corrosion problems. The work would include the study by corrosion testing and metallographic techniques of corrosion associated with welding, heat transfer, and specific industrial media, and would cover laboratory studies and the organization of field tests.

Previous experience, although desirable, is not essential. The salary will be in accordance with experience and qualifications. Pension and insurance schemes are in operation, and, in appropriate cases, assistance can be given for housing. Applications, which will be treated in confidence, should give details of age, qualifications, and experience, and be addressed to The Manager, Development and Research Department, The Mond Nickel Co., Ltd., Thames House, Millbank, London, S.W.1. Mark envelope "Confidential L.42".

Imperial Chemical Industries Limited
Billingham Division
Vacancies for

METALLURGISTS

There are vacancies for Assistant Technical Officers in our division metallurgical laboratories. These appointments offer interesting work in many fields of metallurgy, ranging from long-term research to the diagnosis of metal equipment failures.

Appointments are permanent and pensionable and there is a Profit-Sharing Scheme in operation. Assistance can be given towards house purchase and removal expenses in the case of married men.

Applications are invited from men up to about 30 years of age who hold a Higher National Certificate, L.I.M., or a degree in metallurgy. Some experience in industry is desirable, but applicants who have just completed an academic qualification can be considered.

Write, giving brief details of age, qualifications, and experience, to the Staff Manager, Imperial Chemical Industries, Ltd., Billingham Division, Billingham, Co. Durham, quoting reference W/N/4.

THE GLACIER METAL CO., LTD.

RESEARCH AND DEVELOPMENT ORGANIZATION

Applications are invited for the post of RESEARCH INVESTIGATOR (METALLURGIST). The person appointed will be in charge of a section of five members with responsibility for fundamental research into bearing materials. The job involves planning field and laboratory experiments and interpreting results. Facilities provided include laboratory rigs manned and maintained by trained engineers. Ample ancillary services also available. Company vehicles are used for the field testing of bearings, and the results of such tests, together with service experience in customers' engines, provide a rich source of data. Besides this fundamental work, *ad hoc* problems arise from time to time, and these bring the Metallurgist into contact with Company Production Managers and Engineers and also with fellow Metallurgists in customer firms.

Candidates should preferably have an honours degree in metallurgy and be familiar with standard metallographic techniques. Familiarity with bearing materials and with fatigue- and wear-testing machines is useful.

STARTING SALARY £750–£1200 per annum according to experience. Preferred AGE RANGE 24/30.

The post offers satisfying work and good career opportunities to a man wanting to do fundamental research who likes the experience of seeing his results put into practice.

Applications in writing should be sent to the Personnel Director (Ref. MET), Glacier Metal Co., Ltd., Ealing Road, Alperton, Wembley, Mddx.

LEADING METAL POWDER producing company (not flaky) requires Engineer Metallurgist with experience in powder production and use of powders. Apply stating previous experience and salary required. Our staff is informed of this vacancy. Box No. 433, The Institute of Metals, 17 Belgrave Square, London, S.W.1.

METALLURGIST required for interesting and varied work in the Research and Experimental Department of an Aircraft Construction Company in the South of England. Applicants should be of degree standard with experience of light alloys, steel welding, salt-bath control, and heat-treatment processes. The successful applicant will receive assistance with accommodation and participate in staff assurance and pension schemes. Details of age, experience, salary, &c., should be sent to Box No. 432, The Institute of Metals, 17 Belgrave Square, London, S.W.1.

PROFESSORIAL CHAIR. Metallurgy or Physics of Metals. No administrative assignments. Eastern United States. Starting salary $15,000 per year. September 1958 appointment. Recommendations as well as applications solicited. Box No. 430, The Institute of Metals, 17 Belgrave Square, London, S.W.1.

SPECTROGRAPHER required by leading firm of non-ferrous metal manufacturers, in the Birmingham area, to install and operate new equipment. Applicants must be experienced in spectro-analysis of copper and copper-base alloys. Excellent opportunity for right man. Pension scheme, canteen, 5-day week. Full details of experience, qualifications (if any), and age to Personnel Manager, Box No. 225, Smiths, 19/21 Corporation Street, Birmingham.

SOUTH AFRICAN BUREAU OF STANDARDS

Metallurgist

Applications are invited for the post of metallurgist at the South African Bureau of Standards, Pretoria. Candidates should hold a university degree and have had at least five years' experience covering, if possible, metallography and ferrous and non-ferrous metallurgy. Salary will be on the scale £1080 × £60–£1380, the starting salary depending upon experience and qualifications. A cost of living allowance of £234 p.a. is payable to married male officers.

The Council has a five-day week, generous leave privileges, leave bonus, and provident fund. Passages to South Africa of the selected candidate and his family will be paid.

Further information and application forms are obtainable from the South African Scientific Liaison Officer, Africa House, Kingsway, London, W.C.2.

HADFIELDS, LTD.

Refractories Dept.

Foundry and Steelmaking Refractories Research

(*a*) A vacancy exists for a graduate to work on problems connected with the use of refractories in a steelworks. Fundamental as well as applied research will be undertaken; and the opportunity is available for the successful applicant to work for additional qualifications. Publication of work is also encouraged. The position offered is a responsible post and could lead to a senior appointment in the Company.

(*b*) A capable man is required to take charge of the refractories testing section. Some experience of laboratory methods and calculations is desirable. Preference may be given to applicants with experience in the Refractories field, but this is not a necessary requirement.

Previous applicants need not apply for either of the above posts.

Creep and Mechanical-Testing Dept.

Alloys Research

B.Sc. (Hons.) or M.Sc. in Metallurgy required for material research. This position requires a responsible person willing to work as a member of a research team engaged in alloy development. The team occupies a first class creep and mechanical-testing laboratory and is fully supported by the services of a comprehensive modern research department. Both applied and fundamental research are carried out, and regular publication of results is encouraged. Excellent working conditions. Five-day week. Welfare and dining facilities.

Applications giving details of age and previous experience should be addressed to the Personnel Manager, Hadfields, Ltd., East Hecla Works, Vulcan Road, Sheffield 9, quoting " PL.10779 ".

NOTICE TO AUTHORS OF PAPERS FOR THE "JOURNAL" AND CONTRIBUTORS TO DISCUSSIONS

1. **Papers will be considered for publication from non-members as well as members of the Institute.** They are accepted for publication in the *Journal* and not necessarily for presentation at any meeting of the Institute. MSS. should be addressed to The Editor of the *Journal*, The Institute of Metals, 17 Belgrave Square, London, S.W.1.

2. **Papers suitable for publication** may be classified as:

(*a*) Papers recording the results of original research.

(*b*) First-class reviews of, or accounts of progress in, a particular field.

(*c*) Papers descriptive of works methods, or recent developments in metallurgical plant and practice.

(*d*) Papers in classes (*a*), (*b*), and (*c*) above, previously published in languages other than English, French, German, or Italian, if of sufficient merit.

3. **Manuscripts and illustrations** should be submitted in duplicate. MSS. must be typewritten (*double-line spacing*) on one side of the paper only, and authors are requested to sign a declaration that neither the paper nor a substantial part thereof has been published elsewhere. Exceptions may be made in certain cases where a paper has been published in a language other than English, French, German, or Italian (see 2(*d*) above). MSS. not accepted are normally returned within 6 months of receipt.

In the interests of economy, all papers must be written as concisely as possible; in general, internal research reports are not in suitable form for publication as papers in the *Journal*. All but the simplest mathematical expressions should be written by hand, with capital and small letters clearly distinguished. Superscript and subscript letters should also be plainly indicated. Greek letters and special signs should be identified in the margin. For style, spelling, and abbreviations used, any recent issue of the *Journal* may be consulted.

4. **Synopsis.** Every paper must have a synopsis (not exceeding 250 words in length) which, in the case of a paper reporting original research, should state its objects, the ground covered, and the nature of the results. The synopsis will appear at the beginning of the paper, and should be in a form suitable for use by abstracting organizations. Extracts from a "Guide for the Preparation of Synopses" drawn up by the Abstracting Services Consultative Committee are reproduced below.

5. **References** must be collected at the end of the paper and must be numbered in the order in which they occur in the MS. Initials of authors must be given, and the Institute's official abbreviations for periodical titles (as used in *Metallurgical Abstracts*) should be employed, where known. References to papers should be set out in the style:

A. L. Dighton and H. A. Miley, *Trans. Electrochem. Soc.*, 1942, **81**, 321 (i.e. year, volume, page).

References to books should be in the following style:

C. Zener, "Elasticity and Anelasticity of Metals". **1948**: Chicago (University of Chicago Press).

6. **Illustrations.** Each illustration must have a number and description; only one set of numbers must be used in one paper, and it is desirable to number the half-tone illustrations consecutively, rather than to intersperse them with the line figures. The captions should be typed on a separate sheet.

The set of **line figures** sent for reproduction must be drawn (about twice the size to appear in the *Journal*) in Indian ink on smooth white Bristol board, good-quality drawing paper, co-ordinate paper, or tracing *cloth*, which are preferred in the order given. Co-ordinate paper, if used, must be blue-lined with the co-ordinates to be reproduced finely drawn in Indian ink. Curves should be drawn boldly (i.e. at least twice the thickness of the frame). Experimental points should be indicated by open or closed circles, triangles, squares, &c. (preferably not crosses). Curves should be broken on each side of such symbols and plenty of allowance should be made for closing up in blockmaking. All lettering and numerals, &c., should preferably be in *pencil*, so that the Institute's standard lettering may be affixed, and ample margins must be left outside the framework of the figures to enable this to be done. The second set of line illustrations may be photostat copies.

Photographs must be restricted in number, owing to the expense of reproduction, and photomicrographs should be trimmed to the smallest possible of the following sizes consistent with adequate representation of the subject: 4 in. deep by 3 in. wide: 2 in. deep by 3 in. wide: 2 in. square. Magnifications of photomicrographs must be given in each case. Photographs for reproduction should be loose, not pasted down (and not fastened together with a clip, which damages them), and the figure number and author's name should be written on the back of each. Captions should be given to the photomicrographs, but these should be kept as brief as possible.

Because of the present high cost of printing and paper it is imperative that authors restrict illustrations (particularly photographs) to the absolute minimum deemed necessary to support their argument. Only in exceptional cases will illustrations be reproduced if already printed and readily available elsewhere.

7. **Tables or Diagrams.** Results of experiments, &c., may be given in the form of tables *or* figures, *but* (unless there are exceptional reasons) *not both*. Tables should bear Roman numbers, and each should have a heading that will make the data intelligible without reference to the text.

8. **Corrections.** A certain number of corrections in proof are inevitable, but any modification of the original text is to be avoided. Since corrections are very expensive, the Institute reserves the right to require authors to contribute towards their cost if the Editor deems them to be excessive. The Institute also reserves the right to require a contribution to the cost of remaking any block where this is necessitated by an error on the author's part.

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10. **Discussion.** Except in the case of special symposia, shorthand records of discussions are not taken at meetings. Written discussion may be submitted on any paper, preferably typewritten (*double-line spacing*). References should be given in the form of footnotes. Paragraphs 6 and 7 above are also applicable to such contributions. Reprints of discussion cannot be supplied to contributors.

GUIDE FOR THE PREPARATION OF SYNOPSES

(*As recommended by the Abstracting Services Consultative Committee*)

1. **Purpose.** The synopsis is not part of the paper; it is intended to convey briefly the content of the paper, to draw attention to all new information, and to the main conclusions. It should be factual.

2. **Style of writing.** The synopsis should be written concisely and in normal rather than abbreviated English. It is preferable to use the third person. Where possible use standard rather than proprietary terms, and avoid unnecessary contracting.

It should be presumed that the reader has some knowledge of the subject, but has not read the paper. The synopsis should therefore be intelligible in itself without reference to the paper; for example, it should not cite sections or illustrations by their numerical references in the text.

3. **Content.** The title of the paper is usually read as part of the synopsis. The opening sentence should be framed accordingly and repetition of the title avoided. If the title is insufficiently comprehensive, the opening should indicate the subjects covered. Usually the beginning of a synopsis should state the objective of the investigation.

It is sometimes valuable to indicate the treatment of the subject by such words as: brief, exhaustive, theoretical, &c.

The synopsis should indicate newly observed facts, conclusions of an experiment or argument and, if possible, the essential parts of any new theory, treatment, apparatus, technique, &c.

It should contain the names of any new compound, mineral species, &c., and any new numerical data, such as physical constants; if this is not possible, it should draw attention to them. It is important to refer to new items and observations, even though some are incidental to the main purpose of the paper; such information may otherwise be hidden, though it is often very useful.

When giving experimental results the synopsis should indicate the methods used; for new methods the basic principle, range of operation, and degree of accuracy should be given.

4. **References.** If it is necessary to refer to earlier work in the summary, the reference should always be given in full and not by number. Otherwise references should be left out.

When a synopsis is completed, the author is urged to revise it carefully, removing redundant words, clarifying obscurities, and rectifying errors in copying from the paper. Particular attention should be paid by him to scientific and proper names, numerical data, and chemical and mathematical formulæ.